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ABSTRACT

This paper presents a method to help high school students with learning disabilities increase their vocabulary in preparation for college, including preparation for college entrance examinations such as the Scholastic Assessment Tests (SATs). The approach focuses on the use of elaborative techniques in which students actively generate meanings and applications utilizing multiple senses. The method involves the intersection of categorization, association, and visualization skills. The recommended 10-step vocabulary development program has students prepare cards with visualization and personal association information on them as well as the word's definition. A software program called World of Words has been developed which utilizes the interactive principles of categorization, association, and visualization and applies them to 1,000 words, derived from previous SATs. These words are classified into 75 categories that highlight similarities and differences. Students can interact with the material by typing, drawing, and comparing their impressions with the program's information. (Contains 10 references.) (DB)

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Title: **Technology to Enhance Vocabulary Acquisition: Metacognitive, Multisensory and Motivational**

Presenter: Lois H. Rothschild, M.A.

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SAT scores have dramatically declined over the past twenty years. In 1971 the national mean verbal score was 455. More than twenty years later, after technological advances and with a better understanding of cognitive processes, the mean pre-recentered verbal score was 422, a decline of 33 points. Many educators feel that there is a direct correlation between television viewing, the decline in reading skills and the drop in the SAT verbal scores. In a 1992 National Assessment of Educational Progress report, it was noted that 69% of fourth graders interviewed watched three hours or more of television a day, while less than half (46%) reported daily reading for pleasure. By the time the students reached their senior year in high school, more than 40 percent were still watching TV more than three hours daily and more than 50 percent read fewer than ten pages a day. Better students watch less television; in fact, as television viewing goes down, academic achievement in reading generally goes up.

Learning disabled students who aspire to pursue a college career face a formidable obstacle in the SAT's. Early difficulties with decoding have led to a preference for any activity other than reading. Faced with a verbal inefficiency and unable to develop age-appropriate literacy, vocabulary, even expressive oral vocabulary, may suffer. Teachers often try to remedy verbal deficits by requiring their students to memorize vocabulary lists, but teenagers rapidly forget words they rarely read, hear, or use in normal conversation.

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"ENCYCLOPEDIA" APPROACH

So what should a learning disabled student do? Researchers, such as C. K. Leong, have noted that training in elaborative techniques can improve word knowledge and reading skills. British researchers, Angela Fawcett and Roderick Nicolson, describe an "encyclopedia" approach to word knowledge stressing semantic links across related concepts rather than relying on rote memorization of the "dictionary" definition. They suggest that elaborative techniques based on generating sentences and contexts, cross-linking words, and identifying affective reactions can lead to improved word knowledge and reading skills.

Learning, if it is to be internalized and retained, should involve the senses and be enjoyable. Professor Rassias, a teacher at Dartmouth College since 1965, relies on his past experiences as an actor to teach French to a diverse population of students ranging from thirteen year olds at the Frederick Douglas Academy in Harlem to New York City transit police officers and, of course, Dartmouth students. His teaching style, known as the Rassias method, is made up of classes, drills and cultural presentations. Using props (such as cabbages, wet noodles, carrots, apples and pears) as well as body language (from kissing to kicking), Professor Rassias teaches foreign language in a demanding but exciting environment. His philosophy for life-long language learning is, "If you receive a word emotionally, you're not going to forget it."

LEARNING STYLES

Teachers today not only must deal with a more culturally diverse student population, but also must teach students with multiple, distinct learning styles. Individuals learn in different ways because they have varying strengths in different types of intelligences. Howard Gardner, noted author and Harvard professor, hypothesizes that some people may excel in the academic skills of

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logical/mathematical or linguistic ability, while others are strong in one of the five non-academic intelligences; individuals may possess artistic talent, heightened musical aptitude, athletic prowess, interpersonal skill, or enhanced self-awareness. Teaching students with different learning styles, temperaments, aptitudes, and cultural backgrounds presents as a monumental task to today's educators.

For the past five years researchers at the Harvard Graduate School of Education and 60 Boston area educators have collaborated on a project designed to involve students more thoughtfully in learning. Preliminary findings of the Teaching for Understanding Project suggest that true understanding must be performance-based, that students must be able to do something with the information they acquire. Thus, students should be encouraged to explain, generalize, and apply their knowledge in new situations. Such understanding is subtle and goes far beyond the ability to memorize facts by rote or parrot them back in response to multiple-choice questions.

In order for students to learn for understanding, they need to be in a "generative" learning environment, according to David Perkins, Co-director of Harvard's Project Zero, and Tina Blythe, researcher. While all topics do not lend themselves to a generative cast, adding a theme or perspective can help students make connections between their school work and their lives. Brain research supports the need for interconnectedness in learning. Neurologists have developed a concept of "convergent zones", suggesting that the greater the number of associations, the stronger the link to prior knowledge and the more meaningful the web of convergent zones. Speaking at a neurology conference, Antonio Damasio, M.D., prompts one to "think about how words get their meaning. The brain doesn't look up a dictionary definition. It links words to nonverbal images that supply meaning."

Learning specialist, teacher, and author, Priscilla Vail, describes students' eagerness to make connections as "one of the hallmarks of intelligent thinking."

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She writes in **Learning Styles** that connectedness depends on efficient filing, effortless retrieval and a facility for recombining or integrating. Orderly filing, she suggests, is best accomplished through categorization. Vail asserts that the ability to classify terminology for quick and efficient recall will enhance understanding.

To reach the wide range of students today, educators need to present ideas and materials in a variety of ways. Research on learning suggests that most learners have a preferred style of learning and yet also use a combination of modalities. Information presented in a manner addressing multiple senses will reach a greater number of today's learners. In addition to multisensory input, delivery of instruction should take into account linear learners who prefer systematic sequential processing of information, as well as global learners who think more in terms of interconnections. Addressing many learning styles rather than imparting information in one format, such as lecturing, expands the potential of information retention.

In addition to adapting instruction to incorporate different learning styles and focusing on the interconnectedness of learning, educators should help students build understanding from their personal experiences, feelings and values. Vito Perrone, Director of Teacher Education at Harvard, encourages teachers to "look for topics that relate to students' lives." Gardner and Veronica Boix-Mansilla, a Project Zero researcher, also stress relevance when teaching for understanding. Active learning requires that students be intellectually engaged. This occurs when the topic is of interest to them and when they are participating in meaningful activities.

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VOCABULARY BUILDING METHOD

One way learning disabled students can acquire a college caliber vocabulary is through the creation of mental models. Since research suggests that these students often fail to spontaneously use such cognitive strategies as categoric clustering and the linking of semantically related concepts, direct instruction in the processes of categorization and association and the techniques of visualization is necessary. If verbal deficits are to be reduced, vocabulary needs to be made relevant to the teenagers' personal life experience. Instruction should address all the senses to accommodate all learning styles. Then students will be able to lay down sensory pathways sufficient enough to remand new vocabulary to long term storage. (Select a word, relate it, visualize it, use it.) The principles incorporated in this vocabulary development program are summarized in the Venn diagram that highlights the unique overlapping roles of visualization, categorization and association. (See Figure 1)

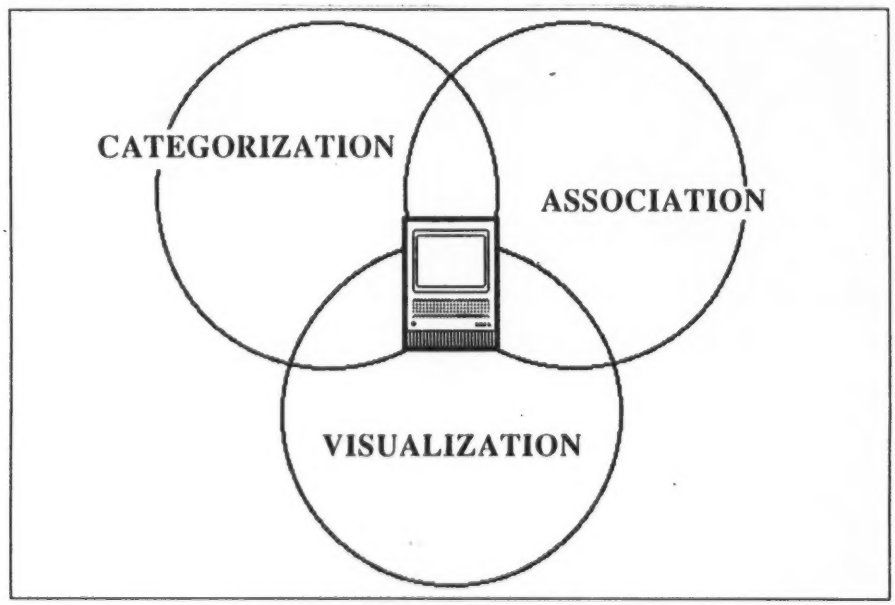

Figure 1 - Venn Diagram

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Students who learn vocabulary via this strategy will be better prepared to respond to questions of vocabulary in context when faced with the SAT's. The Verbal section of the SAT-I places an emphasis on critical reading skills and assesses student ability to determine the meaning of a word from its context. Thus, a precise understanding of how a word with multiple definitions is used in a particular passage is necessary.

The method learning disabled students should use to improve their vocabulary for the SAT's may be summarized as follows:

1. Select a word from your reading or a word list
2. Check the dictionary (or Franklin Language Master) and briefly paraphrase
3. Write your definition on a 4 x 6 card
4. Think: "What does this word mean to me?"
5. Conjure a visual image of the word relevant to you (Visualization) and
6. Write a sentence using the word (Association)
7. Then, draw a simple picture on the back of the card pertinent to your image and your sentence (Stick figures work nicely.)
8. Add synonyms and antonyms. Use simple, as well as sophisticated words. (Categorization)
9. Place the card into a file box for safe keeping
10. Make packages of 10 word cards and study them until you know all the information on the card merely by looking at the word. If you are unsure, look at your picture, which should trigger your mental image and, in turn, lead to successful word retrieval

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11. Use the word in speaking, in writing, and in thinking.

WHY THE COMPUTER

While this method can be used with great advantage at home or in the classroom, addition of the computer allows students of many aptitudes and learning styles to participate more actively in the acquisition of language. Learning disabled students, who may understand words or concepts but who may not be able to process them because of decoding, attentional or organizational difficulties, can be provided with a software vocabulary program customized to their needs. The software offers both flexibility and structure and provides students with alternatives to exclusive text-based study methods. Entitled **World of Words**^{TM}, and utilizing the interactive principles of categorization, association and visualization, this program classifies almost 1000 words, derived from previous SAT's, into 75 categories or Word Families that highlight samenesses and differences. Such chunking of information provides order for learning disabled students.

Associations of meaning and connections are made as words are defined in sentences and, in turn, accumulated into story contexts. Drawings of the story encourage students to visualize meaning. The goal of the program is to increase the amount and longevity of learning by making vocabulary meaningful and relevant. To engage students and increase the number of their associations, vocabulary is presented with a continuing theme (music) and stars a multicultural character (Luther).

World of Words draws from research on memory, metacognition, and learning, as well as widely-tested pedagogical principles for developing effective study skills. The program uses multisensory input to strengthen storage and retrieval of significant vocabulary. Alternative means for learning new words are provided including pronunciations, pictures, written story contexts, and structures

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for students to enter their own interpretations. They can interact with the material by typing, drawing, and comparing their impressions with the program's information. In addition, they can study words in any order according to their individual abilities and preferences.

World of Words provides students with alternatives to traditional text-based study methods. Given the non-sequential interface of the program, activities can be customized to meet the needs of individuals. Also, because the computer is impartial and ever-patient, students can gain the reinforcement they need to develop discipline and confidence in their abilities. In short, **World of Words** provides motivational tools for active learning.

Using **World of Words**, students become engaged and interact with vocabulary in context in individualized ways. The synergy of theoretical foundations, pedagogical strategies, and computer technology makes **World of Words** a powerful study tool.

Success on the SAT's is highly dependent on background experience such as vocabulary exposure. Learning disabled students' low verbal SAT scores can be ameliorated through this innovative approach to vocabulary development. Instruction geared to different learning styles, organization of material to aid in memory retention, and selected vocabulary presented in association with teenagers' interests and life experiences will provide learning disabled students with a college caliber word sense. The principles inherent within this methodology will enable students to develop self-confidence, an expansive vocabulary, and higher SAT scores.

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